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gives "a description of certain objects of unknown significance, formerly used by some New South Wales tribes." These objects are cigar-shaped, of stone or clay, attaining a maximum length of fifty-five centimeters. A number of theories have been advanced to account for their use, but they have not yet been satisfactorily identified. They are decorated with a number of "broad-arrows" and parallel gashes. The seven plates which accompany the article show that these markings are of a rude character, and that considerable variation exists in form and decoration. Mr. Harper brings forward no decisive evidence to account for their use, but concludes with the statement that they are either "pounders" or "ceremonial stones." The latter is a convenient scrap-basket in archæology, and as Mr. Harper does not prove them to be pounders, it might be well to classify them as ceremonial stones; at all events, they are well described and figured in this paper, and others may be able to answer the question raised.

F. R.

ZOÖLOGY.

Adriatic Sponges.¹ — Dr. von Lendenfeld continues in this monograph his exhaustive description of the Adriatic sponges begun in 1891.² Like the earlier works of the series, this is divided into three parts. The first part contains a complete list of the literature on the group; the second, a description of the Adriatic species; the third, a comprehensive review of the structure and classification of the Clavulina in general.

The classification adopted by von Lendenfeld in this series of memoirs is as follows:

Porifera

Class Calcarea

Class Silicea

Subclass Triaxonia

Order Hexactinellida

Order Hexaceratina

¹ Von Lendenfeld, R. Die Clavulina der Adria, *Abhandl. Kais. Leopold. Carol. Deut. Akad. Naturf.*, Bd. lxxix (1898), 12 Taf., p. 251, Halle.

² Die Spongien der Adria, Die Kalkschwämme, *Zeit. f. wiss. Zool.*, Bd. liii (1891); Die Hexaceratina, *Ibid.*, Bd. liv (1894); Die Tetractinelliden der Adria, *Denkschr. Kais. Akad. Wiss. Wien* (math.-naturw. Classe), Bd. lxi (1894).

- Subclass Tetraxonia
 - Order Tetraxonida
 - Suborder Tetractinellida
 - Suborder Lithistida
 - Order Monaxonida
 - Suborder Clavulina
 - Suborder Cornacuspongiae.

Von Lendenfeld defines the Clavulina as marine Monaxonida, possessing as a rule a skeleton made up of rhabdus-like, mostly monactinal, megascleres, arranged for the most part radially to the surface in bundles, and not forming a network in the interior. Occasionally without a supporting skeleton. Mostly without, or with very little spongin. Occasionally with well-developed spongin skeleton. Microscleres, when present, always asters or microrhabdi, never chelæ, sigmas, or toxas. If a well-developed spongin skeleton is present, microscleres of aster or rhabdus type are always found.

This suborder is divided into three tribes: (1) Euastrosa, with euasters, or, if none, then without skeleton. Other microscleres may occur with euasters. Occasionally with spongin. (2) Spirastrosa, without euasters, but with spirasters or other microscleres. Occasionally with spongin. (3) Anastrosa, without microscleres.

In the suborder are included 26 genera, distributed in 10 families. Ridley and Dendy (*Chal. Rep.* on Monaxonida) divide the group into 2 families with 10 genera. Vosmaer (Bronn's *Klass. and Ord.*) makes 2 families with 10 genera, and an Anhang, consisting of 9 genera (chiefly Gray's) of boring sponges, which he provisionally accepts and unites under the family name of Clionidæ. Von Lendenfeld's group owes its size partly to its more comprehensive character, partly to the separation of certain genera from the Clavuline families as recognized by Vosmaer, Ridley and Dendy, such genera being reincorporated as distinct families.

The following brief review of the ten families included in the Clavulina will make plain the scope of the group as defined by von Lendenfeld. In the Tethyadæ are included, along with the type genus and Tethyorrhaphis Lend., a boring sponge (*Xenospongia aspis*), and Sollas's two genera, *Asteropus* and *Coppatias* (united by von Lendenfeld as *Asteropus*), reckoned by Sollas as among the Tetractinellida. The two genera, *Chondrilla* and *Chondrosia*, included by Vosmaer along with *Oscarella* in his *Oligosilicina*, are here separated from the latter genus and placed in distinct families, *Chondrillidæ* and *Chondrosidæ* (*Oscarella* by von Lendenfeld is assigned to the Tetractinellida). The family *Stelligeridæ* is made to include two

genera withdrawn from the Axinellidæ, a family regarded (Ridley and Dendy, *Chal. Rep.*, p. lxii) as transitional between the Halichondrina and Clavulina. These two are *Stelligera* Gray (*Raspailia* Vosmaer, 1887) and *Hemiastrella* Carter (*Epallax* Sollas, 1887). The above four families constitute the Euastrosa.

The family Placospongiidæ includes *Placospongia* Gray, placed by Sollas among the Tetractinellida. The family Dendropsidæ includes Ridley and Dendy's genus *Dendropsis* withdrawn from the Axinellidæ. Instead of uniting them in a single family (Spirastrellidæ), after the manner of Ridley and Dendy, von Lendenfeld separates the two genera *Spirastrella* and *Latrunculia*, creating the family Latrunculidæ for the latter. Under the family name of Spirastrellidæ he groups with *Spirastrella* two genera (*Vioa* Nardo and *Thoasa* Hancock) of boring sponges; two genera, *Ficulina* Gray and *Halicnemis* Bwk., included by Vosmaer and by Ridley and Dendy, under generic names *Stylocordyla* and *Polymastia*, in the Suberitidæ; and *Alectona* Carter, including forms widely separated by Sollas under generic names *Scolopes* (fam. Scolopidæ close to Suberitidæ, Sollas) and *Amphius* (included by Sollas as a Tetractinellid in fam. Epipolastidæ). The above four families constitute the Spirastrosa.

Under the Suberitidæ von Lendenfeld groups five genera (*Papillella*, *Polymastia*, *Tentorium*, *Trichostemma*, *Suberites*), included by Vosmaer either in the Polymastidæ or Suberitidæ, and by Ridley and Dendy in the Suberitidæ; and two others, *Sollasella* Lendf. and *Suberanthus* n.g. The family Stylocordylidæ is erected by von Lendenfeld for a new genus *Astromimus*, together with *Stylocordyla* Thomson, which he withdraws from the Suberitidæ, where it is placed by Vosmaer and by Ridley and Dendy. The Suberitidæ and Stylocordylidæ make up the Anastrosa.

Von Lendenfeld gives a statement of the phylogenetic views which underlie the classification he proposes. *Suberites*, *Spirastrella*, *Tethya* have been the productive genera. They with *Asteropus* have been independently derived from *Tethyorrhaphis*. From *Tethya* have been derived, directly or indirectly, *Xenospongia*, the Chondrillidæ, Chondrosidæ, and Stelligeridæ. From *Spirastrella* have been derived the Placospongiidæ, Latrunculidæ, Dendropsidæ, also directly or indirectly the other genera of the Spirastrellidæ, and the Anastrose genus *Papillella* (Suberitidæ). From *Suberites* have been derived directly, or indirectly, the other genera of Suberitidæ (except *Papillella*), and the Stylocordylidæ.

The Anastrosa (more particularly Suberitidæ) are thus conceived

of as having had a polyphyletic origin, in part (Papillella) from the Spirastrosa, though chiefly from the Euastrosa (Suberites derived from Tethyorrhaphis). Since von Lendenfeld regards (p. 210) Tethyorrhaphis as the "Grundform aller Clavulina," he evidently does not take very seriously the idea (p. 206) that the Euastrosa and Spirastrosa have been independently evolved from different Tetractinellid families — though in the paragraph referred to he apparently countenances this belief.

Of von Lendenfeld's ten families, all but the Latrunculidæ and Dendropsidæ are represented in the Adriatic. Of his twenty-six genera, fifteen, represented by thirty species, are here found. Seven new species (*Asteropus incrustans*, *Stelligera nux*, *Placospongia graeffei*, *Vioa topsentii*, *Vioa ramosa*, *Suberites gracilis*, *Astromimus luteus*) are described, and of the twenty-three already described species, seven for the first time have been found in the Adriatic.

In the descriptive part of the work will be found details of interest concerning the histology and skeleton, together with observations in many cases on the appearance and behavior of the living sponge.

H. V. WILSON.

Revised Classification of the Unionidæ. — Students of the Unionidæ will welcome the revision in the arrangement of the species of this group, which Mr. C. T. Simpson has introduced in Mr. C. F. Baker's report¹ on the Mollusca of the "Chicago area." Anatomical features — other than those of the shell simply — are made the basis for the revision, the structure of the marsupia, for example, being employed as a diagnostic character. The genus *Margaritana* is rejected, *Unio* and *Anodonta* are broken up, the old genera *Alasmoodonta*, *Strophitus*, *Quadrula*, *Obliquaria*, *Plagiola*, and *Lampsilis* are revived, and a new genus, *Anodontoides*, is erected, to provide for the new and more natural grouping of the species. The shell of each of the fifty forms is described at length, and in most instances the external anatomy of the animal is also given. The local distribution is tabulated, and the geographical and geological range of each species is reported. Excavations about the city have revealed as fossils many of the species now reported as living in this area. Measurements are given, and data upon variation, habitat, and breeding are quite extensive. It is to be regretted that the introductory discussion of the group is not phrased in the terms of modern morphology, that

¹ Baker, F. C. The Mollusca of the Chicago Area, Pt. I, The Pelecypoda, *Bull. No. III, Nat. Hist. Surv. Chicago Acad. Sci.* (1898). 130 pp., 27 plates.